Unmanned Aircraft Systems And the Next War

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Second LT Theresa Ross, 1st Brigade Combat Team, 4th Infantry Division, launches an RQ-11 Raven Unmanned Aerial Vehicle (UAV) during training at Fort Carson, Colo., in January. Designed for quick assembly and deployment to small units, the Raven weighs only four pounds.

The First Revolution in UAS

The Army has been incredibly successful in introducing Unmanned Aircraft Systems (UAS) from corps level to platoon. Although still relatively new to combined arms operations, UAS are revolutionizing how the Army fights. In 2003, the Army deployed 13 aircraft for Operation Iraqi Freedom. Some 10 years later, about 1,200 unmanned medium and large aircraft are in the field. This number increases significantly when small UAS (SUAS) are included. Today, just counting medium and large platforms, the Army has more UAS than the U.S. Navy and Air Force combined. Collectively, Army UAS have flown almost two million deployed hours.

The Army's leadership within DoD has been vital in providing the capabilities required to develop and field interoperable and common control systems. Regardless of the airframe, video and data are delivered to command posts, vehicles and individual soldiers via One System Remote Video Terminal (OSRVT). In addition, as proven in theater, delivering information from UAS directly to Apache and Kiowa helicopters, referred to as manned-unmanned (MUM) teaming, is a battlefield combat multiplier.

While the Army should be proud of its accomplishments, it is imperative that we conduct a critical review of our base UAS philosophies and continue to support doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) given an uncertain future of potential near-peer opponents or their proxies. A vital part of this review must include the opportunities of UAS interoperability—capabilities opening the door to doctrinal alternatives whereby an unmanned family of systems (FoS) will again increase combined arms effectiveness—a potential for a second revolution of unmanned systems. This second revolution must significantly expand UAS capabilities while addressing the growing set of future threats. To examine this, one must focus on doctrine, requirements, organization, training and materiel developments.

Doctrine

Because of wartime needs, the surge in UAS has not been matched with developing the user doctrine to support unified field operations—the full-spectrum fight. It is time to catch up. In today's operations, large, medium and small UAS classes—the FoS—often fly simultaneously in the same battlespace but largely as individual entities supporting the fight. Given the strides in technical interoper-

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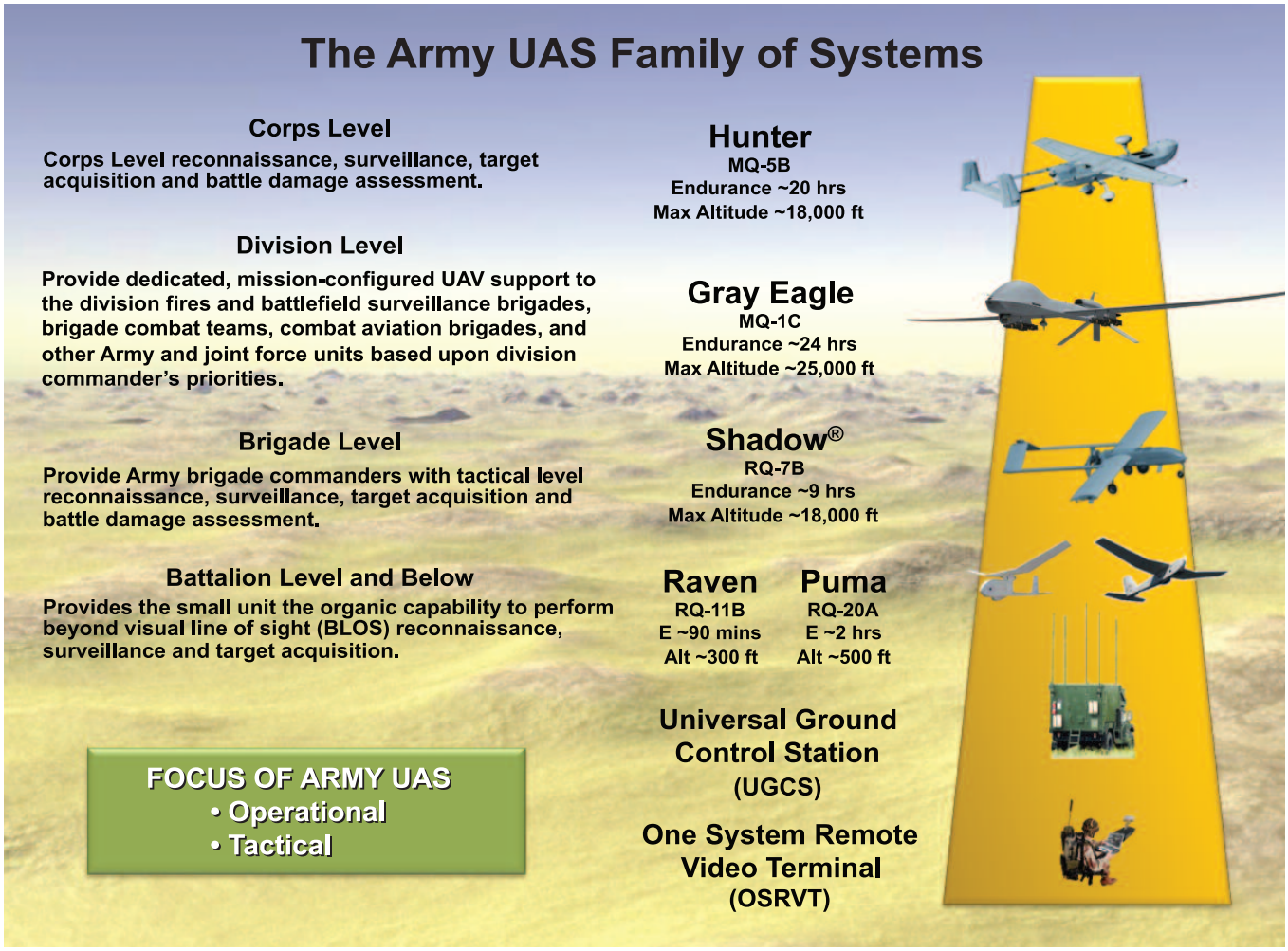

ability already existing between the classes and the force, little doctrine is available to optimize FoS employment and little work is being done to develop FoS future concepts allowed by fielded technologies. This shortfall in doctrine and concepts slows combat development and technology maturation as many stakeholders focus on single platforms rather than prioritizing the FoS as a whole. This doctrine deficit is made worse by some stakeholders failing to recognize that UAS is not aviation in support of maneuver. Rather, UAS is integrated into all echelons and aspects of combined arms operations in the air and on the ground—a critical difference in perspective. The following example of massing of sensors assists in visualizing possible capabilities:

In operations, it is typical to assemble indirect fires from multiple unit echelons to better support the main effort while taking risk in supporting sectors. The Army nearly has the capability to do the same using unmanned sensors.

Given a division in the offense that makes the left sector brigade the main effort, the division commander could choose to cut all or part of his Gray Eagle company and/or multiple brigade Shadow assets to directly support the main effort. Given the Universal Ground Control Station (UGCS) and universal operators, the main effort brigade UGCSs could switch between multiple class airframes to inform the operational picture and assist servicing targets by the many "killer" systems available. Airframes could also be passed to main effort battalions or companies for direct control via OSRVT. At the same time, unmanned ground vehicles could be supporting main effort units and relaying control and sensor data via UAS airframes.

As an economy of force, unattended ground sensors (UGS) could be dropped by UAS airframes in avenues of approach or areas of interest to provide "tip and cue" teaming with UAS, leaving large land areas unmanned. UGS sensor data can be relayed by any line-of-sight airframe. These same airframes could be cued to triggered UGS, thus assessing the threat.

This example is but one of many possible scenarios. The question is how to facilitate the rapid development of FoS concepts with associated technical advances in order to mature total combined arms integration.

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Requirements

Along with developing doctrine and concepts, another shortfall lies in developing requirements for countering future threats and their impacts on total system survivability. Indirect fires on ground nodes, air defense and electronic attacks must be addressed by DOTMLPF. In most forums, discussions focus on larger-class UAS assuming a permissive air environment and ignoring the implications of combat at a level higher than counterinsurgency. This causes us to discount critical requirements and doctrinal issues. Ignoring a more capable threat causes us to undervalue the importance of SUAS, a class that is potentially the most important because of its numbers, ability to operate from any location and ability to survive.

The most valuable and, ironically, most ignored UAS target is the launch recovery site—the aircraft carrier of the battlefield. Why focus on killing individual airborne platforms when the high payoff is to kill multiple airframes along with operators and sustainers in a single blow? Given the fact that the launch recovery site is a vital component of the total system, kinetic attack is a near-certainty for a capable enemy. Actions to correct these shortfalls include:

■ Reducing closely arrayed units that make the launch recovery site a more detectable and lucrative target. (Recent moves toward hub-and-spoke operations in large, centralized MUM combat aviation brigades work against survivability, although they only marginally increase UAS efficiency.)

■ Developing tactics, techniques and procedures (TTP), requirements and materiel changes. Shadow and Gray Eagle platoon equipment will be better dispersed, thereby reducing unit signature and improving jump timelines.

■ Reducing takeoff and landing distances, allowing for operations on improved roads. The "prepared runway" that Gray Eagle requires makes it easy to find and reduces opportunities for dispersion.

Almost all the above are a subset of the need for unit mobility—a return to the mentality of mobile operations. This focus needs to be a priority in trades determining doctrine, requirements and materiel upgrades. Given the risk to larger-class airframe survival, a Russian saying applies: "There is a certain quality to quantity." Larger airframes are more visible, too heavy to support countermeasures and unable to take a hit, so we must have greater numbers. This conclusion has huge implications for requirements, upgrades and war preparation until a new generation of airframes is affordable. They include:

■ Not allowing requirements to grow airframe costs to unattritable levels. (We need many; build Sherman tanks rather than Tiger tanks.)

■ When considering multiple payloads on a single airframe, balancing capability with the overall combined aircraft cost and the significance of loss on the overall battle (given no replacements due to cost).

■ Improving our ability to easily reconstitute damaged units. This includes continued development of multiclass universal products, universal operators and maintainers to support inter- and intra-class cross-leveling, allowing smaller UAS to "move up a class" in critical situations.

■ Having a ready pipeline of airframes and sensors in theater and stateside.

Payloads are the costliest subsystem of—and the reason for—UAS. The Army should review its base philosophies and then revalidate requirements, specifications and payload mixes both for single and FoS aircraft. Stakeholders should work to achieve the following:

An RQ-7 Shadow 200 is launched for the first time at Volk Field, Wis., as the 32nd Brigade, Wisconsin National Guard, verifies that the radio frequency used by the Army National Guard unit is compatible with the frequency used by the Air National Guard control tower.

Wisconsin National Guard/1SG Vaughn R. Larson

■ Balance effectiveness with cost for both single-payload airframes and those capable of multiple payloads (accounting for levels of war, losses, weather, terrain and so on).

■ Look at more effective airframe and payload mixes to support operations and unit reconstitution.

Organization

The above suggestions on FoS, mobile operations and similar requirements will drive some organizational changes within the UAS fleet. Greater impact may come from reorganizing how the Army develops unmanned requirements, funds solutions and executes them. The separation of U.S. Army Training and Doctrine Command (TRADOC) capability managers and program executive officers responsible for the development and integration of UAS, unmanned ground vehicles and unmanned ground sensors—and their payloads—has slowed integration and capability development. At the very least, a general officer steering committee and supporting work groups should be formed to join these offices for requirements, doctrine and materiel development.

Army budgeting also needs to be reviewed. FoS integration must be placed at a level that is equal—if not superior to—individual UAS. Resourcing prioritization methods (by

U.S. Army/Sofia Bledsoe

Foreground from left to right: Gray Eagle, Shadow, Puma, Hunter and Raven UAVs front an AH-Apache Longbow and an OH-58 Kiowa Warrior at Dugway Proving Ground, Utah. All were involved in an exercise there in 2011 that proved interoperability across manned and unmanned platforms.

product) suboptimizes effectiveness as FoS improvements are effectively subordinated to the single product.

Training

Other than for UAS operators, training has not been institutionalized throughout TRADOC. There is little UAS combined arms training for leaders in their normal professional schools. This shortfall can be corrected in at least two ways:

■ UAS unit leadership training must return to a mobile operations/expeditionary mind-set. Training in schools and units should include fundamentals such as jump operations, unit dispersion, signature management, rapid launch-recovery site setup and initial entry operations.

■ Until we fully institutionalize UAS, every level of combined arms leadership training should include subjects such as UAS capabilities, combined arms mission integration, using multiple classes in operations, and mobility/jump/sustainment planning factors for offense and defense.

Materiel Developments

The Quadrennial Defense Review and defense planning guidance explicitly state enemies will have long-range and precise munitions along with the capability to contest the air and space domain. Though unlikely through the mid-term, the possible loss of air supremacy for even short periods would greatly affect the way that UAS fight. Far more likely and dangerous are precision long-range artillery and missile systems. Given the high value of UAS ground nodes, every UAS subsystem is obviously at risk, again calling for dispersion and signature reduction.

A capable enemy will attack our command and control with non-kinetic means, using jamming, cyber attacks and ground system triangulation in preparation for a kinetic attack. This requires us to:

■ Train operators to recognize electronic attacks and work-arounds, and develop assisting automated software.

■ Develop the certain capability to sustain operations in a satellite- and global positioning system-denied environment.

■ Require alternate data links and better directional links to counter a jamming or "direction finding" threat along with better dispersing our emitters.

Whether for requirements, unit organizational constructs or materiel trades, having the simulation tools and expertise to execute complex cost-benefit analyses is critical for making well-informed decisions. To properly evaluate the cost benefit of tactics, upgrades and mixes of products or organizational constructs, three legs of a "decision stool" are needed: technology, cost and force-on-force effectiveness modeling. Over the last decade, the force-on-force simulations leg has been all but lost. It is critical that there be a rejuvenation of industry/government partners that can independently (or in conjunction with U.S. Army TRADOC Analysis Center) run Combat 21 and other simulations to evaluate the effectiveness of capability in scenarios where variations in threat, weather, terrain and organizations can be generated.

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Army accomplishments with UAS have been remarkable. Considering UAS potential, it is critical that the Army review base UAS philosophies and supporting DOTMLPF. Action must be taken to:

■ Codify and teach UAS combined arms doctrine and develop future operational concepts.

■ Examine "next enemy" impacts, especially on the ground.

■ Build for reconstitution and keep airframes and payloads attritable (low-cost).

■ Develop the simulation tools for the complicated trades facing UAS.

Addressing these issues requires the participation of leadership at the highest levels. Stakeholders need to review and agree on UAS philosophies and create the long-range plans and sustaining budgets supporting those views. The time is right for a revolutionary leap in unmanned systems: The interoperability pieces are in place, the next threat is more well-defined, and the budget realities drive us to better combined arms integration. Failure to act certainly means a less effective force, and, given the importance of UAS to operations, inaction fundamentally risks future mission accomplishment. ★